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Mothers and Boys

Orotic Chondry



General Student Study

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Third Edition

ORGANIC CHEMISTRY

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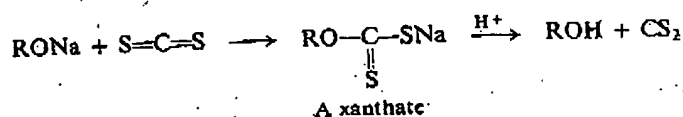
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35.14 Rayon. Cellophane

When an alcohol is treated with carbon disulfide and aqueous sodium hydroxide, there is obtained a compound called a *xanthate*.



Cellulose undergoes an analogous reaction to form *cellulose xanthate*, which dissolves in the alkali to form a viscous colloidal dispersion called *viscose*.

When viscose is forced through a spinnerette into an acid bath, cellulose is regenerated in the form of fine filaments which yield threads of the material known as *rayon*. There are other processes for making rayon, but the viscose process is still the principal one used in the United States.

If viscose is forced through a narrow slit, cellulose is regenerated in the form of sheets which, when softened by glycerol, are used for protective films (Cellophane).

Although rayon and Cellophane are often spoken of as "regenerated cellulose," they are made up of much shorter chains than the original cellulose, due to degradation by the alkali treatment.

35.15 Cellulose ethers

Industrially, cellulose is alkylated by the action of alkyl chlorides (ethyl chlorides, etc.) in the presence of alkali. Considerable degradation of the long cellulose chains is unavoidable in these reactions.

Methyl, ethyl, and benzyl ethers of cellulose are important in the production of textiles, films, and various plastic objects.

PROBLEMS

1. (+)-*Gentiobiose*, $\text{C}_{12}\text{H}_{22}\text{O}_{11}$, is found in the roots of gentians. It is a disaccharide, forms an osazone, undergoes mutarotation, and is hydrolyzed by aqueous acid or by emulsin to D-glucose. Methylation of (+)-gentiobiose, followed by hydrolysis, gives 2,3,4,6-tetra-O-methyl-D-glucose and 2,3,4-tri-O-methyl-D-glucose. What is the structure and systematic name of (+)-gentiobiose?

2. (a) (+)-*Trehalose*, $\text{C}_{12}\text{H}_{22}\text{O}_{11}$, a non-reducing sugar found in young mushrooms, gives only D-glucose when hydrolyzed by aqueous acid or by maltase. Methylation of trehalose gives an octa-O-methyl derivative that, upon hydrolysis, yields only 2,3,4,6-tetra-O-methyl-D-glucose. What is the structure and systematic name for (+)-trehalose?

(b) (-)-*Isotrehalose* and (+)-*neotrehalose* resemble trehalose in most respects. However, isotrehalose is hydrolyzed by either emulsin or maltase, and neotrehalose is hydrolyzed only by emulsin. What are the structures and systematic names for these isomers?

3. *Ruberythric acid*, $\text{C}_{25}\text{H}_{26}\text{O}_{13}$, a non-reducing glycoside, is obtained from the roots of *Rubia*. Complete hydrolysis gives alizarin ($\text{C}_{14}\text{H}_8\text{O}_4$), D-glucose, and D-xylose. Hydrolysis gives alizarin and *primeverose*, $\text{C}_{11}\text{H}_{20}\text{O}_{10}$. Oxidation of primeverose with bromine water, followed by hydrolysis, gives D-gluconic acid and D-xylose. What is the structure and systematic name of primeverose?